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A NEW GENUS OF CAVE BEETLE (CARABIDAE: TRECHINI) FROM SOUTHWESTERN VIRGINIA WITH A KEY TO THE GENERA OF THE TRECHINI OF NORTH AMERICA NORTH OF MEXICO

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During the late summer of 1958 I was privileged to make a biological survey of seventy-five caves in the Appalachian valley of Virginia and West Virginia. This expedition, part of an extensive and continuing survey of the cave fauna of the United States, was supported by a grant from the Penrose Fund of the American Philosophical Society. Particular attention was paid to the troglobious carabids of the tribe Trechini, and nearly seven hundred specimens of these anophthalmous, wingless, rufotestaceous beetles were obtained. With the exception of one specimen, all are referable to the genus *Pseudanophthalmus* Jeannel. This specimen, a unique female teneral, is wholly different from each of the five previously described genera of trechines from caves of the eastern United States, and is described below.

Aphanotrechus NEW GENUS

Anterior tibiae pubescent on outer side, tarsi with lateral but no dorsal grooves; eyes totally absent; wings absent; size medium (5.7 mm in type species); form moderately elongate, subconvex. *Head* with two pairs of clypeal setae, one pair of mid-frontal setae, and four pairs of supraorbital setae; frontal grooves "incomplete" (aphaenopsian type), i.e., not extended onto sides and ventral surfaces of head; mandibles long and porrect, the retinacula trituberculate; maxillary palps glabrous, the terminal segment one-fourth longer than the penultimate segment; labial palps glabrous, with the normal four setae on the penultimate segment, penultimate segment one-sixth longer than terminal segment; mentum very short and edentate, separated from submentum by a distinct suture; submentum (*pièce prébasilaire* of Jeannel) with transverse row of seven long setae at the base and two pairs of setae near the apex. *Pronotum* not pubescent, but with numerous long discal setae; anterior and posterior marginal setae very short.

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Elytra with irregular rows of pubescence on intervals; discal punctures three, the anterior pair placed just posterior to the fourth marginal puncture; chaetotaxial index high (0.80 in type species); sixth and subapical marginal punctures with long setae but humeral series without setae except in the 3rd puncture; apical recurrent groove prominent, the recurrent portion connected medially to apex of 3rd longitudinal stria. Type Species: *A. virginicus* n. sp.

Aphanotrechus virginicus NEW SPECIES

Type: A single subteneral female, American Museum of Natural History, New York; Hugh Young Cave, 0.5 mile southeast of Maiden Spring, Tazewell Co., Virginia; coll. September 8, 1958, by T. C. Barr and Donald Egbert.

Total length 5.67 mm. Testaceous, shining. *Head* 1.52 x 0.97 mm (index 0.64), large and rounded; surface reticulo-alutaceous, shining; labrum with a broad, well defined median lobe; with long setae characteristic of the genus, plus rather long, sparse pubescence distributed over epicranium and genae. *Pronotum* 0.97 x 1.10 mm (index 1.14); cordate, slightly transverse; apex and base subequal, three-fourths the maximum width; anterior angles rounded, subdued; sides homogeneously arcuate, then subparallel immediately before the small, rectangular, elevated posterior angles; anterior and posterior marginal setae reduced, very short; disc subconvex, reticuloalutaceous, bearing about 16 very long, irregularly placed setae. *Elytra* elongate-elliptical, laterally vaguely emarginate, 3.18 x 1.65 mm (index 0.52); surface micro-granulate; disc subconvex, slightly concave in subhumeral areas, though not to the same degree as in *Nelsonites* Valentine; humeri prominent, angular, obliquely sloping, not serrate nor setose; longitudinal striation very shallow, the striae obsolescent beyond the 5th; intervals convex, with coarse, rather long pubescence in irregular rows; apical groove elongate, oblique, directed toward the apex of the 5th longitudinal stria but connected with the 3rd by a finely impressed transverse groove; anterior discal setae just posterior to 4th marginal puncture; medial pair at level of 5th and 6th marginals; posterior pair in apex of 2nd longitudinal stria; anterior discal punctures placed on the 3rd stria, medials on the 3rd interval; chaetotaxial index 0.80, the humeral marginal punctures widely spaced; a short seta in 3rd humeral puncture but no setae in 1st, 2nd, and 4th humerals. *Appendages:* antennae 3.45 mm (0.61 the total body length), pubescence normal for the tribe; mandibles large, both right and left retinacula with three sharp cusps; lacinia, galea, digitus, and maxillary palps all slender and elongate; maxillary palps glabrous, with one or two very short subapical setae on the penultimate and antepenultimate segments; labial palps elongate, the penultimate segment bearing two anterior, one ventral, and one subapical setae in the normal position, but all greatly hypertrophied; glossa rather broad at the apex, with 10 hypertrophied setae, two medials directed anteroventrally, the other 8 horizontal; paraglossae normal, long, hyaline, with an inner fringe of very fine setae; mentum very short, lightly sclerotized, with only the slightest suggestion of a medial tooth; mentum separated from submentum by a clearly visible suture (sharper than in *Ameroduvalius* Valentine but not nearly so distinct as in *Duvalius* Delarouzée); legs all long and slender; metatibia 1.89 mm (0.33 the body length).

The male of the species is unknown.

Discussion

Aphanotrechus is immediately distinguished from other known genera of the Trechini by the lack of a mentum tooth, a most unusual condition in this tribe, in which the tooth is normally sharp and frequently bicuspid. The chaetotaxy is definitely abnormal, especially with regard to the head. The reduction of the marginal setae of the pronotum and humerus and the long discal setae of the pronotum may or may not prove to be of generic significance if additional species of this genus are found and examined, but taken together these characters are highly diagnostic.

The affinities of *Aphanotrechus* are open to speculation. Possibly the future discovery of a male and the study of its aedeagus may clarify the situation. I believe that the minute median eminence on the anterior border of the mentum represents a vestige of a tooth, and prefer to regard the edentate condition as secondary rather than primitive. In any event, *Aphanotrechus* cannot be relegated to the "*Trechoblemus* series" in which Jeannel (1928) has placed *Pseudanophthalmus* and *Neaphaenops*, and to which *Nelsonites* and *Darlingtonea* certainly seem to belong (Valentine 1952). *Ameroduvalius* Val., which possesses a well defined mentum tooth, traces of a suture between the mentum and submentum, and an isotopic transfer apparatus can possibly be fitted into the "*Duvalius* series", as Valentine (1952) has suggested. Following Jeannel's practice of grouping related genera of trechines into these "phyletic series", it seems necessary to establish a monotypic "*Aphanotrechus* series" in which to set apart this aberrant beetle.

The type cave opens at the base of a huge sink in the rolling floor of an anticlinal valley immediately west of Clinch Mountain. The stream issuing from the mouth crosses the floor of the sink and disappears on the opposite side, almost certainly entering the drainage system of Maiden Spring, which is located a half mile distant. The cave consists of a single stream passage of moderate dimensions. It was explored for 200 yards, beyond which the ceiling becomes lower and the water deeper. The single beetle was collected from a small pile of broken rock on a shelf above the stream, beneath a slow, constant drip from a stalactite. A return visit to the cave in October, 1959, was wholly unproductive, probably because of recent heavy rains. Visits to four other caves in the vicinity—between Flat Knob and Clinch Mountain—in September, 1958, and October, 1950, produced five specimens of a small, undescribed species of *Pseudanophthalmus*, but no additional *Aphanotrechus*.

The discovery of *Aphanotrechus* increases to eight the number of known genera of Trechini from North America north of Mexico. Since only four of these are included in a published key (Jeannel 1931), the following key has been prepared. The Mexican genera *Paratrechus* Jeannel, *Mexaphaenops* Bolívar, and *Hygroduvalius* Bolívar have not yet been encountered in the United States, though their occurrence in caves or on mountain peaks in Texas or New Mexico would not be surprising.

KEY TO GENERA OF TRECHINI OF NORTH AMERICA NORTH OF MEXICO

1. Eyes present; color dark brown to black.......... 2
Eyes absent or vestigial; rufotestaceous cave species.......... 3

2. Males with first two protarsomeres enlarged; widespread in cool, moist habitats .... **Trechus** Clairville
Males with only the first protarsomere enlarged; mountains and caves of Tennessee and North Carolina.......... **Microtrechus** Jeannel

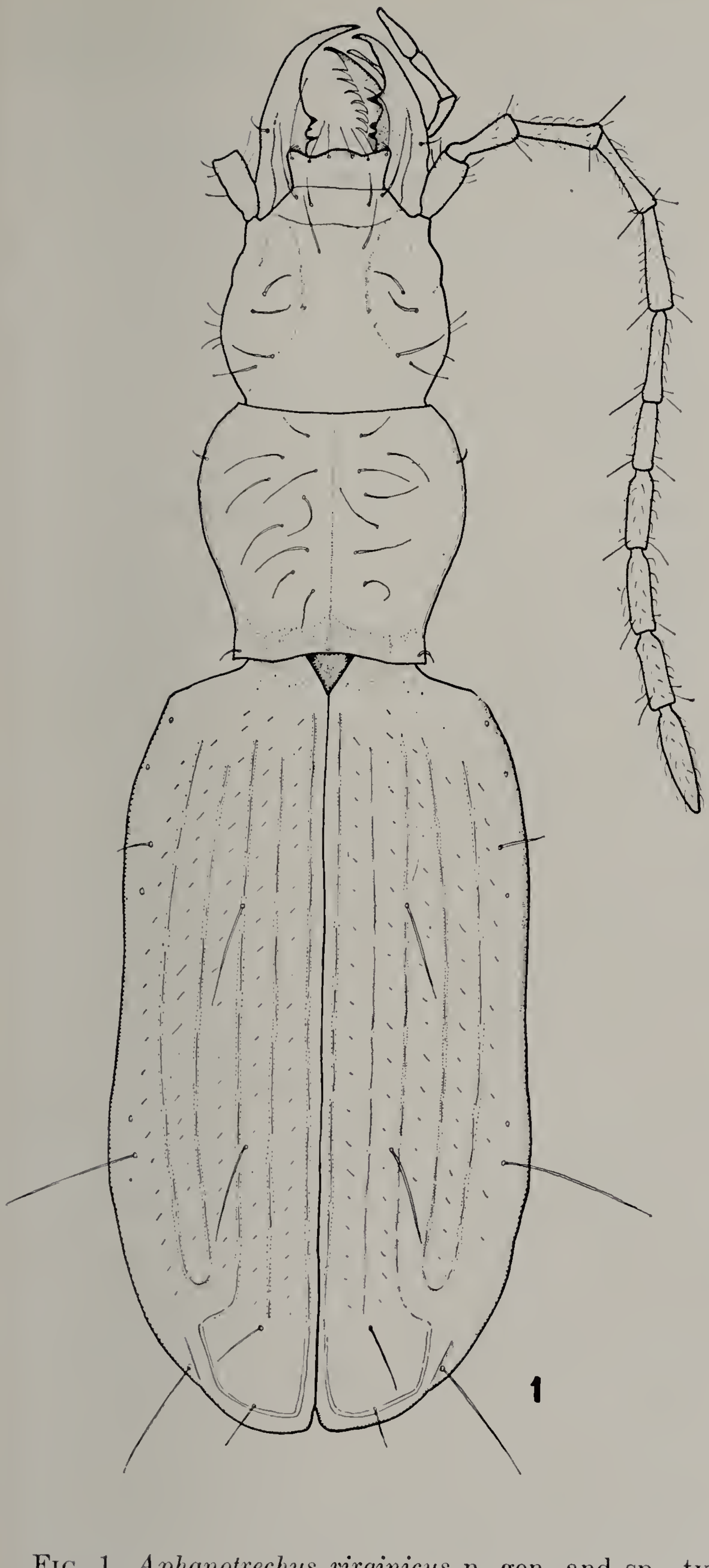
3. Mentum tooth vestigial; head with 4 pairs of supraorbital setae; pronotum with several long discal setae; southwestern Virginia.......... **Aphanotrechus** n. gen.
Mentum tooth well developed; head with one or two pairs of supraorbital setae; pronotum without long discal setae.......... 4

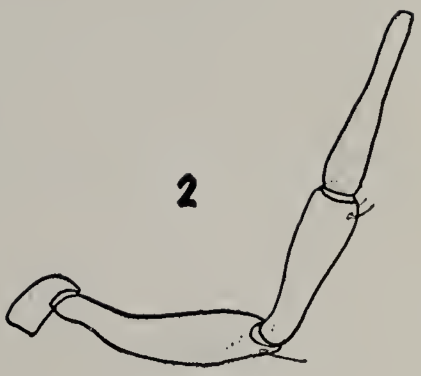
4. Mentum separated from submentum by a more or less well developed suture; copulatory pieces symmetrically arranged in internal sac (isotopic); apical recurrent groove running into 5th longitudinal stria of elytron; Cumberland Plateau of southeastern Kentucky.......... **Ameroduvalius** Valentine
Mentum clearly fused to submentum; copulatory pieces asymmetrically arranged in internal sac (anisotopic); apical recurrent groove running into 3rd or 5th longitudinal stria of elytron.......... 5

5. Elytra with two pairs of discal setae (the 3rd pair may be vestigial).......... 6
Elytra with three well defined pairs of discal setae (except in **Pseudanophthalmus audax** (Horn), which is unique in possessing only the posterior pair).......... 7

6. Head with two pairs of supraorbital setae; submentum with transverse row of 8 or 9 long setae (excluding the hypertrophied seta on the outer edge of each epilobe); apical groove of elytron prominent, well developed, running into 3rd longitudinal stria; Cumberland Plateau of southeastern Kentucky and adjacent portions of Tennessee.......... **Darlingtonea** Valentine
Head with one pair of supraorbital setae; submentum with transverse row of 10 to 12 long setae; apical groove of elytron vestigial; western Pennyroyal Plateau of Kentucky from the Ohio River south to the Tennessee border.......... **Neaphaenops** Jeannel

7. Size large (6.2-8.0 mm); frontal grooves "incomplete", i.e. not extended onto sides and ventral surface of head; glossa with 10 to 12 long, hypertrophied setae; humeri sharply angular, subhumeral areas sloping, deplanate, concave; recurrent portion of apical groove of elytron running into 5th longitudinal stria; Cumberland Plateau in Kentucky and Tennessee.......... **Nelsonites** Valentine
Size variable (3.0-7.0 mm); frontal grooves "complete", i.e. extended onto sides and ventral surface of head; glossa with 8 long setae; humeri more rounded; without subhumeral concave areas; recurrent portion of apical groove running into 3rd longitudinal stria (except to the 5th in two Indiana spp., **P. youngi** Krekeler and **P. shilohensis** Krekeler); unglaciated, Paleozoic limestone areas of Alabama, Georgia, Indiana, Kentucky, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia.......... **Pseudanophthalmus** Jeannel





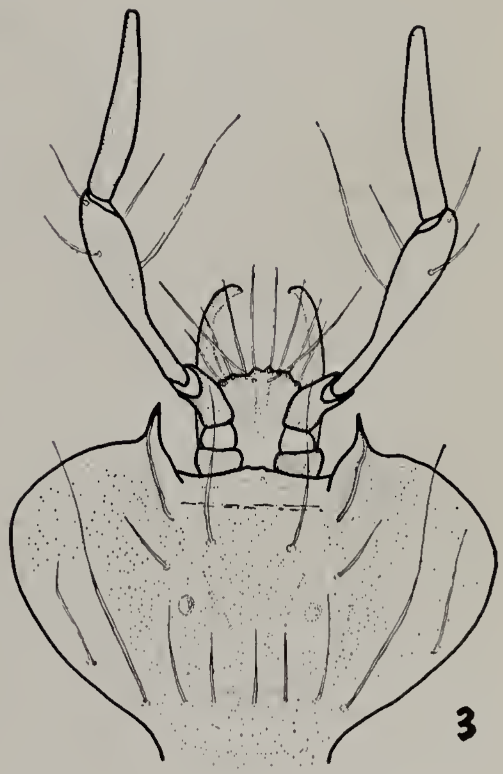


FIG. 1. *Aphanotrechus virginicus* n. gen. and sp., type female, Hugh Young Cave, Tazewell Co., Virginia. FIG. 2. *A. virginicus* n. gen. and sp., maxillary palp of type. FIG. 3. *A. virginicus* n. gen. and sp., labium of type.

Literature Cited

JEANNEL, R. 1928. Monographie des Trechinae, morphologie comparée et distribution géographique d'un groupe de Coléoptères: 3^{e} partie, les Trechini cavernicoles. L'Abeille (Paris), vol. 35, pp. 1-808.

JEANNEL, R. 1931. Révision des Trechinae de l'Amérique du Nord. Biospeologica LVI. Archives de Zoologie expérimentale et générale, vol. 71, pp. 403-499.

VALENTINE, J. MANSON. 1952. New genera of anophthalmid beetles from Cumberland caves. Geological Survey of Alabama, Museum Pap. No. 34, pp. 1-41.

BEETLE POLLINATION IN DRACUNCULUS AND SAUROMATUM (ARACEAE)

By BASTIAAN J. D. MEEUSE *and* MELVILLE H. HATCH[1]

The famous Lamarck, in 1777, was the first to draw attention to the development of considerable heat in the inflorescences of certain arum lilies (3). This phenomenon, which can lead to a difference in temperature with the environment of about 20° C, is accompanied by the production of a pronounced odor, different from species to species but usually carrion-like. A truly classical demonstration of its biological significance was given in 1926 by Knoll (1). For the two European species, *Arum maculatum* and *Arum italicum,* he could show that the odor serves the purpose of attracting large numbers of small insects—mostly Psychodid flies, but also some Staphylinid beetles—which are thereupon trapped in the floral chamber where they are held prisoner for about a day. Since the pistillate or female flowers at the base of the floral column are the first ones to reach maturity, and since some of the visitors may have come from other Arum inflorescences that were in the process of shedding their pollen, the likelihood of cross-pollination is great. The staminate or male flowers, grouped together in the region just above the female flowers, do not shower the captive insects with their pollen until a short time before the moment when certain wilting phenomena make escape from the trap possible. An insect-attracting function of the heat could not be demonstrated; its main (or perhaps even its exclusive) role may well be the volatilization of the odoriferous substances.

Predominant carrion beetle pollination has been described by Van der Pijl (5) for a number of Amorphophallus species, including the giant *Amorphophallus titanum,* in the East Indies; by Schmucker (4) for *Dra-*

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[1] A contribution from the Departments of Botany and Zoology at the University of Washington. The beetle identifications are by M. H. H.; the collections and observations and the writing of the paper are by B. J. D. M.